

**ABSTRACT**

An optical wavelength tracking apparatus and method in a wavelength division multiplexed (WDM) passive optical network (PON) in which a central office (CO) having a multi-frequency light source is connected to a plurality of optical network units (ONUs) having loop-back light sources through a WDM MUX/DEMUX in a remote node (RN). The power levels of downstream and upstream WDM optical signals are measured. The WDM wavelengths of the multi-frequency light source and the WDM MUX/DEMUX are controlled to be nearly identical in order to minimize the difference between the power levels of the downstream and upstream WDM optical signals.